Environmental Impacts of Recreational Boating in the Gulf Islands National Park Reserve of Canada

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Introduction

The new Gulf Islands National Park Reserve, located in the Southern Strait of Georgia, is a fragmented coastal park with jurisdiction extending 200m into the ocean from the low tide line. Recreational boating, a popular activity in these waters, causes many stresses to the marine environment including pollution (Piehler et al 2002; Albanis et al 2002), increased turbidity (Beachler and Hill 2003), and physical damage from anchoring (Walker et al 1989; Francour et al 1999). Many popular anchorages are found within the 200m boundary under Parks Canada jurisdiction, providing the framework for recreational boat anchoring management such that ecological integrity of the park is maintained (the primary mandate of Parks Canada according to the Canada National Parks Act of 2000).

However, to effectively manage boat anchoring, the park management team must have a good understanding of boating activity in park waters and how this activity overlaps with sensitive nearshore habitats. The purpose of this study is to provide baseline data on boating activity and habitat distribution at two popular anchorages in the park, as well as to provide a protocol for ongoing monitoring of boat anchoring impacts. The sensitive habitat that forms the focus of this study is eelgrass (*Zostera marina* L.), playing an important role in sediment stabilization, primary productivity, and providing physical habitat for fish and invertebrates (Duarte 2002). Specific objectives of this project include mapping current benthic habitat distribution at anchoring sites, building an inventory of anchoring intensity for each site and compiling a baseline inventory of benthic community infauna and environmental conditions at each anchoring site. Preliminary results of the benthic habitat mapping and anchoring inventory will be discussed in this paper.

Study Sites

Two contrasting anchorages were selected for this study. Sidney Spit is very close to the Saanich peninsula and is an easy day trip for Victoria residents. This site is the larger of the two, with 19 permanent mooring buoys and a relatively large area for anchoring. In contrast, Tumbo Island is a small, sheltered anchorage located directly northwest of Saturna Island, halfway between Victoria and Vancouver. It is long and narrow with only 10 mooring buoys and a smaller area for anchoring.

Habitat Mapping

Methods

Underwater video surveys were completed in May and September, 2004 (before and after the main summer boating season), with a custom built underwater video camera towed at approximately 1 knot in a series of parallel transects. An overlay of depth, temperature and GPS coordinates was stamped on the image, which was recorded on VHS and digital video tape. Video data were manually coded by stopping the tape at 20 second intervals and recording information from the overlay as well as the presence or absence of eelgrass. Depth data were corrected for tidal height to provide detailed bathymetry for the sites. Data were imported to ArcMap (ESRI, Redlands, California) as xy point files and eelgrass distribution was mapped using the Thiessen polygon method.

Results

Eelgrass distribution was closely linked to water depth and was only found in depths of approximately 1.5m below chart datum or less at both sites. Unsurprisingly, meadows were patchiest at the beginning of the summer and many

gaps were filled in after the summer growing season. These data are most useful, however, as a baseline reference for the park to monitor change in eelgrass using the same data collection protocol over the coming years.

Anchoring Inventory

Methods

Park facility operators were asked to mark locations of anchored and moored boats on paper maps as well as the size and type of each boat (sail or power). Approximately 30 counts were carried out at each site during July and August of 2004. Maps were scanned and digitized in ArcMap (ESRI, Redlands, California) for further spatial analysis. Statistical analysis was carried out with SPSS 11.0 (Thomsen Corporation, Stamford, CT).

Results

An overlay of boat anchoring locations on the habitat maps at both sites shows that boat anchoring is taking place in eelgrass meadows. In particular, at Tumbo Island, boats are unexpectedly anchoring in the shallow area of the site, well inside the eelgrass bed and far from the mooring buoys and shore facilities.

At Sidney spit, the number of boats anchoring and mooring stayed approximately constant through the week. In contrast, weekend activity at Tumbo Island was more than double the weekday activity, with a quadrupling in anchoring boats on weekends. At Tumbo Island, large powerboats were most often observed, whereas small sailboats were most often observed at Sidney Spit. Clearly, the boating activity at each site is very different, with respect to type and size of boat as well as usage throughout the week.

Summary

This study highlights the need for ongoing monitoring of sensitive coastal habitats such as eelgrass meadows. Because national parks exist both to maintain ecological integrity and facilitate recreational activity, an inventory of habitats and a better understanding of the relationship between park users and these habitats are critical to fulfilling these goals. Though the scale of this project is small, exploring only one habitat and one human impact over one season, it contributes a baseline for two popular anchorages in the Gulf Islands and provides a protocol for ongoing monitoring of boat anchoring impacts in this park. As well, understanding the difference in the ways each anchorage are used by boats will allow site-specific tailoring of anchoring management by the park. Further research will incorporate study on the effects of anchoring pressure on the invertebrate communities inhabiting eelgrass beds at these anchorages.

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